

for such a situation on high soils is quite suited for conifers, and if on heavy soils sufficient for oak and other hard-wooded trees. Mr. Boulger points out, what ought to be apparent to all, that the growth of rushes, the wood rush (*Lucula*), the bog asphodel (*Narthecium*), a yellow star-like plant, the tufted hair-grass (*Aira cespitosa*), or of mosses on the surface, are sure indications of the absolute necessity of drainage. Though these are facts with which a practical forester is well acquainted, it is nevertheless necessary to impress them upon the minds of all interested in forest produce. Some useful hints as to the preservation of timber for fencing, or in damp underground situations, are given in the number of the *Journal* for the current month.

R. PICTET describes some interesting experiments (*Arch. Sc. Phys.*, lix.) made for the purpose of determining the conditions under which transparent or non-transparent ice is formed. It was ascertained that water frozen in a vessel dipped in a cold glycerine solution formed perfectly transparent ice as long as the temperature ranged between 0° and -1.5° . If the solution was cooled below -3° , the ice was whitish and of a less specific gravity, these properties being intensified with the lowering of the temperature. No difference in the melting-point or amount of warmth required for melting was observable among the various varieties of ice. The opacity of ice results from an irregular arrangement of the ice-crystals, as well as from the presence of small bubbles of air—less than $\frac{1}{2}$ mm. in diameter—which are mechanically inclosed. They can be removed by slowly conducting through freezing water large bubbles of air which carry with them the small bubbles.

At a public meeting held in the Cheltenham Masonic Hall on December 15, Sir F. Abbott in the chair, it was resolved to institute a "Cheltenham Philosophic Society," which should hold its meetings during the winter months. Upwards of fifty gentlemen signified their desire to become members, and a committee was formed to draw up rules to be submitted at a future date to a general meeting for their sanction.

DR. JOHN RAE asks us to state that in his paper on Eskimo skulls read at the Anthropological Institute on May 8 last, and published in the newly-issued number of the *Journal* of the Institute, he by mistake called the Western Eskimo Brachycephalic, whereas they are Mesocephalic.

IN the letter on the meteor last week, p. 124, " $8 (\pm 2) \times \text{Lyræ}$," should be $8 (\pm 2)$ times Lyræ.

THE additions to the Zoological Society's Gardens during the past week include a pair of Musk Deer (*Moschus moschiferus*), from Central Asia, presented by Sir Richard Pollock; a pair of Axis Deer (*Cervus axis*), from India, presented by Dr. Carl Siemens; a Diana Monkey (*Cercopithecus diana*), from West Africa, presented by Mr. P. Spink; a Bonnet Monkey (*Macacus radiatus*), from India, presented by Mr. T. H. Evans; a Patas Monkey (*Cercopithecus ruber*), from West Africa, a Red-backed Saki (*Pithecia chiropotes*), a Red-faced Spider Monkey (*Ateles paniscus*), two Kinkajous (*Cercoleptes caudivolvulus*), a Coati (*Nasua nasica*), an Azara's Fox (*Canis azarae*), a Black Vulture (*Cathartes atratus*), from South America, deposited two Schlegel's Doves (*Chalcopelia pulla*), from West Africa, two Lesser Razor-billed Curassows (*Mitua tormentosa*), from South America; two Waxwings (*Ampelis garrulus*), four Bullfinches (*Pyrrhula rubicilla*), European, purchased; four Common Waxbills (*Estrelida cinerea*), two Cinereous Waxbills (*Estrelida caerulescens*), six Orange-cheeked Waxbills (*Estrelida melopoda*), two African Silver Bills (*Munia cantans*) seven Yellow-rumped Seed Eaters (*Crithagra chrysopyga*), from West Africa, received in exchange; a Chinchilla (*Chinchilla lanigera*), born in the Gardens.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—The Syndicate, appointed in May, 1875, to consider the requirements of the university in different departments of study, have just issued their fourth report on the subject. After stating that in their opinion the inter-collegiate system should be further stimulated and supplemented by the institution of university readerships, and that by a more complete organisation the requisite provision for teaching and the encouragement of research might be to a considerable extent made, they nevertheless are of opinion that certain subjects of great importance are not now represented in the professoriate, the absence of which from such representation constitutes a serious defect in the Cambridge system, and they recommend that professorships amongst other subjects should be created as soon as the resources of the university permit, in comparative philology, mental philosophy and logic, physiology, English language and literature.

The Syndicate, with regard to existing professorships, suggest that the Professorship of Mineralogy should be for the future a Professorship of Mineralogy and Mineral Chemistry.

There are other subjects of scarcely less importance of which there ought always to be recognised teachers in the University, although the Syndicate are not prepared to say that the teacher ought always to have the status of a professor. Such are analytical chemistry, morphological and physiological botany (as distinguished from systematic botany), comparative anatomy (as distinguished from zoology), pathological anatomy.

In other subjects, again, it is desirable that the University, without establishing permanent offices, should have the means of appointing professors or other teachers from time to time when there is the opportunity of securing the services of a specially competent person. Such are the theory and history of education, as also some special departments of natural science.

The following is the Natural Science Tripos' list for this year:—Class I.—(2) Ds. Bower, Trinity; (4) Cullen, Christ's; (1) Fenton, Christ's; (1) Greaves, Christ's; (2 and 3) Hill, Downing; (1) Ohm, Emmanuel; (3) Sedgwick, Trinity. Class II.—Ds. Harrison, Christ's; Holthouse, Trinity; Houghton, St. John's; Merton, St. John's; North, Sidney; Taylor, E. F. Vinter, Sidney. Class III.—Ds. Allen, St. John's; Buckmaster, Downing; Foster, Trinity; Wallis, St. John's; Weldon, Caius. The numbers indicate the subjects for knowledge of which the candidates are placed in the first class as follows:—1. Physics, chemistry, and mineralogy. 2. Botany. 3. Zoology and comparative anatomy, human anatomy, and physiology. 4. Geology.

EDINBURGH.—The second meeting of the session of the Edinburgh University Chemical Society, was held on the 12th instant, John Gibson, Ph.D., F.R.S.E., vice-president, in the chair. J. S. Thomson communicated a paper on solutions of litmus, in which he explained the preservation of the colour of such solutions on exposure to the air by the action of the air preventing fermentation. He also read a paper on the Determination of Melting Points.

TECHNICAL UNIVERSITY.—It may be remembered that a Committee of the City Companies has been for some time at work elaborating a scheme for founding a technical university in London. The last step taken by the Committee was to procure reports and suggestions from six specially nominated referees, viz., Prof. Huxley, Col. Donnelly (of the Science and Art Department), Capt. Douglas Galton, Mr. H. T. Wood (Assistant-Secretary of the Society of Arts), and Mr. Bartley (of the Science and Art Department). After having decided on these names, the Committee adjourned to allow time for the preparation of the reports. On Thursday last week they met again, and the reports were laid before them. After some discussion the further consideration of the subject was adjourned till January 17.

TAUNTON COLLEGE SCHOOL.—The Science Scholarship at Keble College, Oxford, is awarded to Mr. R. G. Durrant, of the Taunton College School. This is the fourth brilliant success that the school has gained in the last five months, and it is probably the last. The able science master, Mr. Shenstone, leaves at Christmas to take a Science Mastership at the revived Exeter Grammar School. He will not be replaced at Taunton, and the science teaching, which, after years of toil against obstacles, is just beginning to bear fruit, will become a thing of the past.

AUSTRIA.—The Austrian Government has for a number of years been accustomed to bestow liberal grants to the more promising students in the universities, under the condition that the recipients shall make use of them to undertake a course of study in the German universities. The results of this plan seem to be satisfactory, for we notice that this winter an unusually large number of students in all branches have been sent to the various universities in Germany.

A BERLIN POLYTECHNIC.—Berlin, with all her numerous educational establishments, has lacked hitherto a polytechnic such as is to be found in most of the German industrial centres at the present day. This want will soon be repaired, a commission having completed the plans for an extensive institution which will embrace nearly every branch of technical education. The plans for the necessary buildings have already been prepared, and as there is but little doubt that the Prussian Chamber of Deputies will grant the 9,300,000 marks required, the work of erection will commence next spring. On account of the extensive character of the proposed edifices, five years will be required for completion.

SOCIETIES AND ACADEMIES

LONDON

Mathematical Society, December 13.—C. W. Merrifield, F.R.S., vice-president, in the chair.—The Rev. W. Ellis was elected a member.—Mr. S. Roberts read a paper on normals, which contained theorems depending on the invariants and covariants of the quartic equation representing a pencil of four normals to a conic, and drew attention to the remarkable cubic locus of the points of possible concurrence of these normals at the vertices of a given inscribed triangle.—Dr. Hirst and Mr. J. J. Walker spoke on the subject. Prof. Cayley, F.R.S., read a paper on "the geometrical representation of imaginary quantities and the real (m , n) correspondence of two planes."

Linnean Society, November 15.—Dr. Gwyn Jeffreys, F.R.S., vice-president, in the chair.—Mr. J. Jenner Weir exhibited a case of Alpine butterflies, interesting for their similarity to, though not specifically identical with, those obtained by the naturalists of the Polar Expedition.—Three papers on the Arctic fauna followed. I. Report on the Insecta including Arachnida, collected by Capt. Feilden and Mr. Hart during the recent Arctic expedition, by R. McLachlan. It seems there were obtained of Hymenoptera 5, Coleoptera 1, Lepidoptera 13, Diptera 15, Hemiptera 1, Mallophaga 7, Collembola 3, Araneida 6, and of Acarida 6 species, namely, a total of 57 species. Bearing in mind these are from localities between 78° and 83° N. lat., that among them are thirty-five specimens of gaily-coloured butterflies and two species of humble-bees, and it becomes evident the insect-fauna of this so-called "land of desolation" is, after all, not so meagre as anticipated. The paucity of beetles and abundance of butterflies are each striking features. From variations in certain well-known species obtained, Mr. McLachlan suspects they represent a local fauna, and he regards the latter as having affinity to the Lapland fauna, inclining to think both are but lingering remnants of a once former and extensive circumpolar fauna.—II. Preliminary notice on the surface fauna of the Arctic Seas as observed in the recent Arctic expedition, by Dr. Edw. L. Moss (late surgeon, H.M.S. *Alert*). The author observes that the seas north of the Greenland settlements are subject to such varying conditions at different seasons of the year that their surface-fauna cannot be supposed to be very constant. Nevertheless, judging from what fell under his observation during the voyage, he divides the watery area into three zoological regions: (a) A district in the latitude of Melville Bay, temporarily monopolised by infusoria, *Peridinea*; (b) a north-water region inhabited by Pteropods, Tunicates, and Hydrozoa; and (c) a sub-glacial region comparatively lifeless, so far as sea-surface implies.—III. On the annelids of the British North Polar Expedition (1875-76), by Dr. W. C. McIntosh. This collection, dredged between 70° and 82° N., was not so rich in numbers or species as that procured by the storeship *Valorous* in Davis Straits, but some eight species were got which were not among the latter's collection. None are new, but notwithstanding they help to render clear some points in the geographical distribution of the marine worms, so far as the circumpolar area is concerned.—Dr. H. Trimen exhibited specimens of the Olibanum, or Frankincense tree (*Boswellia carterii*, Birdw.), gathered by Mr. J. Collins from the trees planted at Aden. Dr. Trimen, in making some remarks

on the variability of the foliage of the species of *Boswellia*, expressed the opinion that *B. Bhau-Dajania*, Birdw., was not specifically separable from *B. carterii*. *B. Fereana*, which yields the fragrant resin called "Luban Metyi," and which Hanbury considered to be the African "Elemi," is much chewed by Orientals, but rarely imported into England. It is found in the Somali land, where Hildebrandt recently collected it.—The following gentlemen were elected Fellows of the Society: Mr. W. S. Lawson, Mr. W. Joshua, and the Rev. M. A. Maccherd.

Geological Society, December 5.—Prof. P. Martin Duncan, F.R.S., president, in the chair.—Dr. Isaac Bayley Balfour, David Burns, Samuel Cooke, Henry Drummond, Sandford Fleming, Rev. John Hodgson, William Etheldred Jennings, Henry Merryweather, Robert Robinson, Martin Stewart, George Eastlake Thomas, Robert F. Tones, and Irwine J. Whitty, were elected Fellows of the Society.—A portrait of Mr. J. Evans, D.C.L., F.R.S., V.P.G.S., was presented by the President.—The following communications were read:—On the building-up of the White Sinter Terraces of Roto-Mahana, New Zealand, by the Rev. Richard Abney, M.A., F.G.S.—Additional notes on the Dimetian and Pebidian Rocks of Pembrokeshire, by Henry Hicks, F.G.S. The additional facts communicated by the author show that at a distance of about ten miles to the east of the Dimetian axis of St. David's there is another ridge of these rocks, which also runs nearly parallel with it. This is also flanked by Pebidian and Cambrian rocks, and made up of rocks like those in the St. David's axis. The Dimetian formation, so far as it is at present known, consists chiefly of the following rocks:—1. Quartz porphyries, containing frequently perfect quartz crystals (double pyramids), subangular masses of quartz, and crystals of felspar in a felspathic matrix. 2. Fine-grained greyish quartz-rocks, very compact, and interstratified with the above. 3. Ashy-looking shales of a dull green colour, sometimes highly indurated, but usually showing lines of lamination. Microscopically these show basaltic characters, and are probably greatly altered interbedded basaltic lavas. 4. Compact granitic-looking rocks. 5. Quartziferous breccias. 6. A series of compact quartzites and crystalline schists, interstratified by green and purple altered basaltic lavas, with a slaty and schistose foliation, and by some dolomitic bands. Of the Pebidian formation new areas were added, and the portions described in the author's previous paper were further extended, and details as to the chief mineralogical characters added. At the base of the series resting unconformably on the Dimetian is seen an agglomerate composed of large angular masses of a spherulitic felstone, pieces of quartz and quartzites, indurated shales, crystalline schists, &c., cemented together by a sea-green matrix of felstone. These are followed by conglomerates of the same materials, which are again succeeded by indurated shales, often highly porcellanitic in character, with a conchoidal fracture. These are followed by a thick series of silvery white and purplish shales and green slates, alternating with fine and rough ashes, often conglomeritic, hornstone breccias, felstone lavas, &c. The series, as exhibited at St. David's, has a thickness of over 8,000 feet; and as it is everywhere, so far as yet seen, overlapped unconformably by the Cambrians, it may probably be of much greater thickness. It evidently consists very largely of volcanic materials, at first derived from subaërial, but afterwards from submarine, volcanoes. These materials, however, were also undoubtedly considerably aided by sediments of a detrital origin. The whole series shows that the sediments have undergone considerable changes, but yet not sufficient to obliterate the original characters, and the lines of lamination and bedding are usually very distinct. That they were altered nearly into their present state before the Cambrian sediments were deposited upon them, is clear from the fact that the pebbles of the Cambrian conglomerates which rest immediately on any portion of the series are almost invariably made up of masses of the rocks below, cemented by gritty materials on an unaltered matrix, and from which the pebbles may be easily removed. The great conglomerates at the base of the Cambrians, everywhere in Wales, indicate that there were beach- and shallow-water conditions over those areas at the time, and that the sea was then encroaching on an uneven land, becoming gradually depressed to receive the subsequent Cambrian sediment.—On some pre-Cambrian (Dimetian and Pebidian) rocks in Caernarvonshire, by Henry Hicks, F.G.S. In this paper the author gave an account of the special examination of the great ribs of so-called intrusive felspathic and quartz porphyries which are found associated with the Cambrian rocks in Caernarvonshire, made by him in company with Prof. Hughes,